

**[DESCRIPTION]****[Invention Title]**

BOTTLE CAP

**[Technical Field]**

5           The present invention relates, in general, to bottle caps and, more particularly, to a bottle cap in which an additive different from the material contained in a bottle body is stored in an isolated state and which opens an isolated additive storage space thereof when desired to discharge the additive into the bottle body, thus mixing  
10 different kinds of materials together in the bottle body.

**[Background Art]**

Most bottles currently trading on the market contain one kind of material in each bottle. However, in an effort  
15 to provide a variety of tastes to users, it is sometimes required to mix different kinds of materials together to prepare a mixture prior to using the mixture. For example, a coffee-based beverage may be mixed with sugar or cream therein; medicines and chemicals are similar cases.

20           In order to mix two different kinds of materials together to provide a mixture, however, it is necessarily to buy two bottles respectively containing the two different materials therein. Particularly, in the case of materials

needing to be mixed together at an exact mixing ratio, a measuring instrument should be used for accurate measurement. Without such a measuring instrument, it is very difficult to keep the mixture ratio exact, so that the properties of the mixed materials may be worsened and, sometimes, the mixed materials may not be used.

Thus, in an effort to overcome the above-mentioned problems, a bottle cap which contains an additive different from a bottled material has been proposed. However, the bottle cap containing an additive is problematic in that the additive storage space of the bottle cap is exposed to the atmosphere or does not maintain a desired seal. In other words, the fluidities of some additives contained in the bottle caps may change in accordance with variation in atmospheric temperature. If a bottle cap does not have a desired seal in the above-mentioned state, the additive may leak from the bottle cap due to an increase in the inner pressure of the bottle cap. Particularly, the seal of a bottle cap closely relates to changes in the quality and properties of an additive during long distance transportation of products and long-term storage of the products in changing seasons. Thus, the seal structures of additive storage spaces of bottle caps have been actively studied.

#### **[Disclosure]**

Accordingly, the present invention has been made

keeping in mind the above problems occurring in the related art, and a first object of the present invention is to provide a bottle cap which contains in an isolated additive storage space thereof an additive to be mixed with a bottled material, and opens the additive storage space simultaneously with an opening action thereof as desired, thus easily discharging the additive into the bottle body.

Another aspect of the first object of the present invention is to provide a bottle cap which maintains the desired seal on the additive storage space containing therein the additive, thus withstanding a change in inner pressure of the additive storage space, and preventing a change in quality of the additive during long-distance transportation or long-term storage of products, and, furthermore, preventing vapor or gases generated from a bottled material from being introduced into the additive storage space.

In order to accomplish the above-mentioned objects, the present invention provides a bottle cap comprising: an opening unit inserted into the mouth of a bottle body and open at upper and lower ends thereof, with a cutting unit integrally provided in a lower portion of the opening unit; an additive storage container comprising a main cap fastened to the mouth through a screw-type engagement, and an additive storage part extending in an axial direction at a position inside the main cap and being inserted into the opening unit, with a recess provided at the lower end of

the additive storage part and receiving therein the cutting unit, and a breakable part integrated with the lower end of the additive storage part such that the breakable part is cut by the cutting unit during rotation of the additive storage part, thus discharging an additive from the additive storage part; and an upper cap which opens or closes the upper end of the additive storage container.

A second object of the present invention is to provide a bottle cap which causes breakage of a locking ring simultaneously with a rotating action of an additive storage container, thus allowing a user to conveniently use the bottle cap.

In order to accomplish the above-mentioned object, the present invention provides a bottle cap comprising: an opening unit inserted into the mouth of a bottle body and provided with a receiving chamber in an upper portion thereof; an additive storage container assembled with the opening unit at a position outside the opening unit and operated in conjunction with the opening unit to discharge an additive into the bottle body; and a separation means for controlling rotation of the additive storage container relative to the opening unit, thus allowing the opening unit to be removed from the bottle body when the additive storage container is removed from the bottle body.

The opening unit is provided with the receiving chamber which has a cylindrical shape, the receiving

chamber having an open upper end, a lower end provided with a discharge port, and a breaking unit protruding upward in an axial direction from the lower end of the receiving chamber; and the additive storage container comprises: an  
5 end plate placed on the open upper end of the receiving chamber; a main cap extending in an axial direction from an outer circumferential edge of the end plate and being provided with an internal thread which engages with the external thread of the mouth through a screw-type  
10 engagement; and a slider extending in an axial direction from an inner circumferential edge of the end plate and being movably inserted into the receiving chamber of the opening unit such that the slider can be moved in the chamber in an axial direction, the slider being  
15 hermetically closed at a lower end thereof by a breakable part which is broken by the breaking unit.

A third object of the present invention is to provide a bottle cap which is configured such that an opening unit, along with an additive storage container, is removed from a  
20 bottle body during a rotating action of the additive storage container, thus allowing a user to conveniently drink a mixture.

In order to accomplish the above-mentioned object, the opening unit of the present invention is provided with  
25 the receiving chamber which has a cylindrical shape, the receiving chamber having an open upper end and a lower end

provided with a discharge port; and the additive storage container comprises: an end plate placed on the open upper end of the receiving chamber; a main cap extending in an axial direction from an outer circumferential edge of the end plate and being provided with an internal thread which  
5 engages with the external thread of the mouth through a screw-type engagement; and a slider extending in an axial direction from an inner circumferential edge of the end plate and being movably inserted into the receiving chamber  
10 of the opening unit such that the slider can be moved in the chamber in an axial direction, with a discharge opening formed at a lower end of the slider such that the discharge opening communicates with the discharge port at a predetermined position.

15 The separation means comprises: an inside spiral ratchet formed around a sidewall of the receiving chamber at a position close to an open upper end of the receiving chamber by extending outward in a radial direction; and an outside spiral ratchet formed on an inner surface of the main  
20 cap at a position above the internal thread by extending inward in a radial direction so that the outside spiral ratchet interferes with the inside spiral ratchet.

A locking ring is coupled to a lower end of the main cap with a breakable line provided between the locking ring  
25 and the main cap, the locking ring being restricted from moving downward by an upper surface of a support ring which

is formed around the outer circumferential surface of a lower portion of the mouth.

An annular space is defined between the locking ring and the outer circumferential surface of the mouth, thus  
5 allowing the main cap to be inserted into the annular space.

A fourth object of the present invention is to provide a bottle cap which is configured such that an outer cap and an opening unit can be removed from the mouth of a bottle body at the same time after an additive has been discharged,  
10 thus realizing a desired cutting structure and a desired sealing structure which may not be provided in a conventional structure to discharge the additive without using an isolating means.

In order to accomplish the above-mentioned object,  
15 the present invention provides a bottle cap comprising: a cylindrical opening unit opened at upper and lower ends thereof, with a locking protrusion protruding inward in a radial direction from the upper end of the opening unit, and first and second cutting blades extending upward from  
20 the lower end of the opening unit at diametrically opposite positions, the opening unit being inserted into the mouth such that the opening unit can move in an axial direction, but is restricted from rotating in a predetermined direction; and an additive storage container comprising: an  
25 outer cap extending in an axial direction from an outer circumferential edge of an end plate and being fastened to

the mouth through a screw-type engagement; an additive storage part extending in an axial direction at a position inside the outer cap, with a locking protrusion provided around an outer circumferential surface of the additive storage part and engaging with the locking protrusion of the opening unit; and an additive isolating plate which extends along a central axis of the end plate and is placed across a diameter of the additive storage part and which acts as a partition wall.

10           The additive isolating plate may be configured as an independent element which is fitted into a fitting groove formed on the end plate.

          An inclined slot is formed on the upper end of the mouth, and a flange extends outward in a radial direction from an outer circumferential surface of the opening unit at a predetermined position, with a fitting protrusion axially protruding from a lower surface of the flange and fitted into the inclined slot, thus restricting the opening unit from rotating in the predetermined direction.

20           A fifth object of the present invention is to provide a bottle cap which has a function of directly discharging an additive through a discharge opening formed on a breaking unit, and which allows the breaking unit to easily pierce a breakable part, thus allowing the additive to quickly flow downward and to be quickly discharged, and which allows a user to shake the bottle body, thus completely discharging



the additive without any additive remaining in the additive storage part, and efficiently dissolving the additive in a bottled material.

In order to accomplish the above-mentioned object, the present invention provides a bottle cap comprising: an opening unit inserted into the mouth of a bottle body; an additive storage container fastened to the outside of the mouth and operated in conjunction with the opening unit, thus discharging an additive into the bottle body; and a separation means for controlling rotation of the additive storage container relative to the opening unit, thus allowing the opening unit to be removed from the bottle body when the additive storage container is removed from the bottle body. In the bottle cap, the locking ring can be separated from the container during rotation of the container, thus allowing a user to conveniently use the bottle cap. The bottle cap is also advantageous in that the opening unit, together with the container, can be removed from the bottle body during rotation of the container.

#### 20      **[Description of Drawings]**

FIG. 1 is a sectional view illustrating the construction of an assembled bottle cap according to the first embodiment of the present invention;

FIG. 2 is a perspective view schematically illustrating an important part of the first embodiment of

the present invention;

FIG. 3 is a sectional view illustrating an open state of the first embodiment of the present invention;

FIG. 4 is a sectional view illustrating the construction of an assembled bottle cap according to the second embodiment of the present invention;

FIG. 5 is a sectional view illustrating the operation of the second embodiment of the present invention when an additive is discharged into a bottle body;

FIG. 6 is a sectional view illustrating the operation of the second embodiment of the present invention when an additive storage container is removed from the bottle body;

FIG. 7 is a sectional view illustrating the construction of an assembled bottle cap according to the third embodiment of the present invention;

FIG. 8 is a sectional view illustrating the operation of the third embodiment of the present invention when an additive is discharged into a bottle body;

FIG. 9 is a sectional view illustrating the operation of the third embodiment of the present invention when an additive storage container is removed from the bottle body;

FIG. 10 is a sectional view illustrating an assembled state of the third embodiment of the present invention;

FIG. 11 is a sectional view illustrating the operation of FIG. 10;

FIG. 12 is a sectional view illustrating the

operation of FIG. 11;

FIG. 13 is a sectional view illustrating the operation of FIG. 12;

FIG. 14 is a plan view illustrating the construction  
5 of a bottle body mouth of FIG. 13;

FIG. 15 is an exploded perspective view illustrating the construction of the interior of an additive storage container of FIG. 12;

FIG. 16 is a sectional view illustrating the  
10 assembled state of a bottle cap according to the fifth embodiment of the present invention;

FIG. 17 is a sectional view illustrating the operation of FIG. 16 when an additive is discharged into a bottle body;

FIG. 18 is a sectional view illustrating the  
15 operation of FIG. 16 when an additive storage container is removed from the bottle body; and

FIG. 19 illustrates a breaking means of FIG. 16 in a sectional view and a plan view.

20 **[Best Mode]**

FIG. 1 is a sectional view illustrating the construction of an assembled bottle cap according to the first embodiment of the present invention.

As shown in the drawing, the bottle cap according to  
25 the present invention comprises a bottle body 100 having a

mouth 110 with an external thread 112 formed around the outer circumferential surface of the mouth 110, and an opening unit 200 inserted into the mouth 110 such that the opening unit 200 can be removed from the mouth 110. An additive storage container 300 is fastened to the external thread 112 of the mouth 110 through a screw-type engagement and interferes with the opening unit 200 when the container 300 has been loosened from the mouth 110 by a predetermined distance, thus removing the opening unit 200 from the mouth 110. The bottle cap also has an upper cap 400 which is assembled with the upper end of the container 300.

The opening unit 200 is a cylindrical body which is open at upper and lower ends thereof, with a cutting unit 250 integrally coupled to the lower end of the opening unit 200 by a coupling piece 258.

The additive storage container 300 includes an end plate 310 placed on the upper end of the opening unit 200, which is provided with a flange 221. The flange 221 will be described in detail later herein. A main cap 320 integrally extends downward in an axial direction from the outer circumferential edge of the end plate 310 and is provided with an internal thread 322 which engages with the external thread 112 of the mouth 110 through a screw-type engagement. An additive storage part 330 integrally extends downward in an axial direction from the inner circumferential edge of the end plate 310 and is movably inserted into the opening unit

200 such that the storage part 330 can be moved in the opening unit 200 in an axial direction. An extension part 350 integrally extends upward in the axial direction from the outer circumferential edge of the end plate 310, with the upper cap 400 assembled with the extension part 350 through a screw-type engagement.

The flange 221 is integrally formed on the upper end of the opening unit 200, and has an outside protrusion 222 which is formed around the flange 221 such that the outside protrusion 222 protrudes outward in a radial direction. An external thread 230 having the same pitch as that of the external thread 112 of the mouth 110 is formed around the outer circumferential surface of the opening unit 200 in a range extending from the flange 221 to a position spaced apart from the flange 221 by a predetermined distance. An outside hooking protrusion 324 is formed around the uppermost end of the internal thread 322 of the main cap 320 by protruding inward in a radial direction so that the outside hooking protrusion 324 engages with the external thread 230 of the opening unit 200 through a screw-type engagement and also comes into contact with the outside protrusion 222 at a predetermined position.

Furthermore, an inside protrusion 224 is formed around the flange 221 such that the inside protrusion 224 protrudes inward in a radial direction. An inside hooking protrusion 332 is formed around the outer circumferential surface of the

additive storage part 330, which acts as a slider, at a position corresponding to the outside hooking protrusion 324, so that the inside hooking protrusion 332 protrudes outward in a radial direction and comes into contact with the inside protrusion 224 at a predetermined position.

The opening unit 200 has an internal ratchet 232 around the circumference of a root of the external thread 230 at a position close to the flange 221. The inside end of the outside hooking protrusion 324 is provided with an external ratchet 326 that is allowed to rotate only in one direction relative to the internal ratchet 232.

A recess 360 is provided on the lower end of the sidewall of the additive storage container 300 by being dented inward in a radial direction. The cutting unit 250 is integrally provided at the lower end of the opening unit 200 such that the cutting unit 250 is inserted into the recess 360.

As illustrated in detail in FIG. 2, the recess 360 is defined by a breakable wall 362 and a support wall 364 so that the recess 360 has a triangular shape. The cutting unit 250 is pointed at a tip thereof, with a curved cutting blade 252 formed along a lower edge of the cutting unit 250. The cutting unit 250 is integrally coupled to the lower end of the opening unit 200 by the coupling piece 258.

The additive storage container 300 has a projection 366 which comes into contact with a pressure part 256 of the

cutting unit 250 at a predetermined position. The projection 366 is preferably formed in a range extending from the support wall 364 to a predetermined position which is angularly spaced apart from the support wall 364 at an angle of about 30 - 60 degrees. An inclined surface 366a is provided at the start end of the projection 366.

The bottom wall of the additive storage container 300 is formed by a breakable part 340 which is made of a thin film so that the breakable part 340 is easily cut by the cutting blade 252.

The breakable wall 362 is preferably provided with a breakable line 368 thereon so that the breakable wall 362 can be easily broken. In the present invention, the breakable line 368 may be formed over the entire breakable part 340 including the breakable wall 362.

The reference numeral 312 in the drawings denotes a communication hole which allows atmospheric pressure to act in the additive storage container to easily discharge the additive.

The first embodiment of the present invention having the above-mentioned construction will be operated as follows.

The initial state of the bottle cap according to the first embodiment is illustrated in FIG. 2. When the main cap 320 in the initial state is rotated in an opening direction, the additive storage container 300 is rotated in the same direction. During the rotation of the container 300, the

cutting blade 252 breaks the breakable wall 362 and advances into the additive storage part 330. When the cutting blade 252 has advanced into the additive storage part 330 to a predetermined depth after breaking the breakable wall 362, the bottom wall of the additive storage container 300, which is the breakable part 340, is cut by the cutting blade 252. During the above-mentioned cutting operation, the additive storage container 300 is rotated along the external thread 112 of the mouth 110 so that the rotation of the container 300 causes upward movement of the container 300 to a predetermined height. Thus, the height of the breakable part 340, which is pressurized by the pressure part 256 of the cutting unit 250, gradually increases so that the cut part of the breakable part 340 becomes sufficiently wide.

When the above-mentioned operation continues, the projection 366 is cut by the cutting blade 252 and, at the same time, pressurized by the pressure part 256. The projection 366 in the above-mentioned state advances into the lower surface of the pressure part 256 due to the inclined surface 366a provided on the projection 366 so that the projection 366 is excessively pressurized. Thus, the cut part of the breakable part 340 is sufficiently opened downward based on the lower end of the support wall 364 so that an open state of the breakable part 340 illustrated in FIG. 3 is accomplished. Therefore, the additive is discharged from the container 300 into the bottle body 100.



When the additive storage container 300 is further rotated in the same direction, the outside hooking protrusion 324 comes into contact with the outside protrusion 222 at the predetermined position and, at the same time, the inside  
5 hooking protrusion 332 comes into contact with the inside protrusion 224. Thus, the container 300, together with the opening unit 200, starts to be removed from the mouth 110.

The construction of an assembled bottle cap according to the second embodiment of the present invention is  
10 illustrated in FIG. 4. As shown in FIG. 4, the bottle cap according to the second embodiment comprises a bottle body 100 having a mouth 110 with an external thread 112 formed around the outer circumferential surface of the mouth 110, and an opening unit 200 inserted into the mouth 110 such that  
15 the opening unit 200 can be removed from the mouth 110. An additive storage container 300 is fastened to the external thread 112 of the mouth 110 through a screw-type engagement and interferes with the opening unit 200 at a predetermined position during the rotation of the container 300 relative to  
20 the mouth 110, thus removing the opening unit 200 from the mouth 110.

The bottle body 100 is provided with a support ring 114 which is formed around the neck of the bottle body 100 by extending outward in a radial direction at a predetermined  
25 position below the lower end of the external thread 112.

The opening unit 200 is a cylindrical body which is

open at the upper end thereof and is provided with a plurality of discharge ports 212 at the lower end thereof. The plurality of discharge ports 212 is preferably formed around the lower end of the sidewall of the opening unit 200.

5 It is more preferable to extend the discharge ports 212 to predetermined positions on the bottom wall of the opening unit 200. Furthermore, at least one breaking unit 220 is formed on the inner surface of the bottom wall of the opening unit 200 such that the breaking unit 220 protrudes upward in

10 an axial direction. In the present invention, it is preferable to provide two or more breaking units 220.

The additive storage container 300 includes an end plate 310 which has a ring shape and is placed on the open end of the sidewall of a receiving chamber 210 of the opening unit 200. A main cap 320 integrally extends downward in an axial direction from the outer circumferential edge of the end plate 310 and is provided with an internal thread 322 which engages with the external thread 112 of the mouth 110 through a screw-type engagement. An additive storage part

20 330 acting as a slider integrally extends downward in an axial direction from the inner circumferential edge of the end plate 310 and is movably inserted into the receiving chamber 210 of the opening unit 200 such that the storage part 330 can be moved in the receiving chamber 210 of the opening unit 200 in an axial direction. The additive storage

25 part 330 opens or closes the discharge ports 212.

The lower end of the additive storage part 330 acting as the slider is hermetically closed by a breakable part 340. The breakable part 340 is made of a material which can be easily broken by the breaking units 220. In the present invention, it is possible to form the breakable part 340 by integrating a thin film, made of a synthetic resin, with the lower end of the additive storage part 330. Preferably, the breakable part 340 is formed using a thin aluminum film. More preferably, the breakable part 340 is configured such that the breakable part 340 can be easily broken, but reliably maintains its state coupled to the additive storage part 330 without being completely removed from the storage part 330 even when the breakable part 340 is broken.

The additive storage container 300 is provided with a locking ring 341 which is coupled to the lower end of the main cap 320. The locking ring 341 is integrally formed with the main cap 320 through a molding process such that the ring 341 is coupled to the main cap 320 by a plurality of connection ribs 342 forming a breakable line. The locking ring 341 is placed around the external thread 112 with an annular space defined between the locking ring 341 and the outer circumference of the external thread 112. The size of the above-mentioned annular space is determined to allow the main cap 320 to be inserted into the space.

The upper end of the additive storage container 300, which is formed by the end plate 310, is provided with an

opening 334 so that the upper end of the slider 330 is open. The opening 334 of the container 300 is closed by an upper cap 350 so that the opening 334 can be opened or closed as desired. The upper cap 350 may be assembled with the upper  
5 end of the container 300 through a screw-type engagement as shown in the drawing. It is possible to assemble the upper cap 350 with the container 300 through a fitting process.

An inside spiral ratchet 214 is formed around the outer circumferential surface of the sidewall of the  
10 receiving chamber 210 at a position close to the open end of the receiving chamber 210 by extending outward in a radial direction. An outside spiral ratchet 325 is formed on the inner circumferential surface of the main cap 320 at a position above the internal thread 322 by extending inward in  
15 a radial direction so that the outside spiral ratchet 325 engages with the inside spiral ratchet 214 of the opening unit 200. The inside spiral ratchet 214 and the outside spiral ratchet 325 are configured such that the outside ratchet 325 is allowed to rotate only in one direction  
20 relative to the inside ratchet 214.

The operation of the bottle cap according to the second embodiment of the present invention will be described herein below. In the following description, the term "clockwise" means a tightening direction in which the  
25 additive storage container 300 is tightened onto the mouth 110 of the bottle body, and the term "counterclockwise" means

a loosening direction in which the additive storage container 300 is loosened from the mouth 110. FIG. 5 illustrates a container 300 which has completely advanced into the opening unit 200 by being rotated clockwise from an initial state shown in FIG. 4. As shown in the drawings, when the container 300 is rotated clockwise, the internal thread 322 of the main cap 320 is rotated along the external thread 112 of the mouth 110 and moves downward (in the tightening direction). In the above state, the support ring 114 prevents downward movement of the locking ring 341 so that the connection ribs 342 are broken. Thus, only the main cap 320 is inserted into the annular space between the mouth 110 and the locking ring 341. Furthermore, the additive storage part 330 acting as a slider moves downward so that the breakable part 340 of the slider 330 is broken by the breaking units 220 placed below the breakable part 340. Thus, the additive is discharged into the bottle body 100 through the discharge ports 212. As the slider 330 continues its downward movement, the open part of the breakable part 340 becomes wider so that the additive is completely discharged into the bottle body 100 when the opening action is finished as shown in FIG. 5.

Furthermore, during the above-mentioned rotation of the container 300, the outside spiral ratchet 325 is rotated and moves downward. When the outside spiral ratchet 325 engages with the inside spiral ratchet 214, the outside

spiral ratchet 325 can be rotated relative to the inside spiral ratchet 214 due to the ratchet structure thereof. Thus, the main cap 320 can continue its downward movement while a click sound is generated from the spiral ratchets 214 and 325. In the above state, the teeth of the outside spiral ratchet 325 pass over the teeth of the inside spiral ratchet 214 and are seated in the roots defined between the teeth of the inside spiral ratchet 214. Because the two spiral ratchets 214 and 325 in the above state are not restricted in the rotating direction thereof, the outside spiral ratchet 325 can be freely rotated around the inside spiral ratchet 214.

When the container 300 in the above state is rotated counterclockwise, the container 300 is rotated along with the opening unit 200 because the inside spiral ratchet 214 prevents the outside spiral ratchet 325 from rotating in the opposite direction. During the counterclockwise rotation of the container 300, the internal thread 322 of the container 300 is rotated along the external thread 112 of the mouth 110 and moves upward, so that the container 300 and the opening unit 200 can be removed from the mouth 110 at the same time as shown in FIG. 6.

In the above state, the locking ring 341, which remains around the neck of the bottle body 100 after the connection ribs 342 are broken, is independent from the main cap 320 so that it is required to separately handle the ring

341. In order to accomplish the above-mentioned object, a skirt (not shown) is preferably provided at a position below the lower end of the locking ring 341 so that the skirt is stopped by the support ring 114 and supports the locking ring 341 around the support ring 114 without requiring additional handling of the locking ring 341.

When the additive storage container 300 of the bottle cap according to the second embodiment of the present invention is rotated, the locking ring 341 naturally becomes separated from the main cap 320 so that it is not necessary to intentionally separate the ring 341 from the main cap 320. Thus, it is possible to conveniently use the bottle cap and remove both the container 300 and the opening unit 200 from the bottle body at the same time.

FIGS. 7 through 9 illustrate the third embodiment of the present invention. In this embodiment, the additive storage container 300 is provided with a plurality of discharge openings 336 capable of allowing the additive to be more efficiently discharged into the bottle body. In the third embodiment, those elements common to both the second and third embodiments carry the same reference numerals and further explanation of the elements is not necessary in the following description.

In the third embodiment, the opening unit 200 is provided with a plurality of discharge ports 212 around the lower end of the sidewall thereof. The discharge openings

336 are formed around the lower end of the sidewall of the slider 330 such that the openings 336 communicate with the discharge ports 212 at predetermined positions.

In the initial state of the bottle cap having the  
5 above-mentioned construction according to the third  
embodiment, the discharge openings 336 are closed by the  
sidewall of the opening unit 200 as shown in FIG. 7. When  
the container 300 in the above-mentioned state is rotated  
clockwise, the slider 330 moves downward and the discharge  
10 openings 336 are rotated toward the discharge ports 212 so  
that the openings 336 are gradually aligned and communicate  
with the ports 212. Thus, the additive is initially  
discharged through the openings 336 and the ports 212 into  
the bottle body. If the container 300 is completely rotated  
15 and finishes its downward movement, the openings 336 fully  
communicate with the ports 212 and completely discharge the  
additive into the bottle body 100. The actions of the other  
parts during the operation of the bottle cap, which include  
the action of breaking the locking ring 341 and the relative  
20 action of the two spiral ratchets, remain the same as those  
described for the second embodiment, and further explanation  
is not necessary. Furthermore, the operation of removing the  
bottle cap from the mouth of the bottle body remains the same  
as that of the second embodiment, as illustrated in FIG. 9,  
25 so that the operation can be understood from the drawing  
without further explanation.



The above-mentioned third embodiment is advantageous in that the additive can be discharged by communication of the discharge openings 336 of the slider 330 with the discharge ports 212, so that it is possible to more efficiently discharge the additive into the bottle body using a simple structure.

FIGS. 10 through 13 illustrate a bottle cap according to the fourth embodiment of the present invention.

As shown in FIG. 10, the additive storage container 300 comprises an outer cap 320 and an additive storage part 330 configured to contain two kinds of additives therein. To provide the above-mentioned container 300, a fitting groove 351 is provided on the inner surface of the upper end of the container 300. A partition wall 352 is fitted into the fitting groove 351 so that the interior of the storage part 330 is divided into two spaces respectively containing therein different kinds of additives, for example, sugar and cream. The lower end of the storage part 330 is closed by a thin film which forms a breakable part 340. The upper end of the mouth 110 of the bottle body 100 is provided with inclined slots 160. The opening unit 200 is provided with fitting protrusions 212 which are fitted into the inclined slots 160 after moving on the inclined surfaces of the slots 160 during clockwise rotation thereof. To assemble the container 300 with the opening unit 200, the storage part 330 is inserted downward into the receiving chamber 210 of the

opening unit 200. In the above state, the internal thread 312 of the outer cap 320 engages with the external thread 112 of the mouth 110 until a locking protrusion 386 of the additive storage part 330 forcibly passes downward over a locking protrusion 286 of the opening unit 200.

The container 300 is stopped at a position in which first and second cutting blades 220C and 220D of the opening unit 200 are placed just below the breakable part 340 of the container 300. A precise stop position of the container 300 relative to the cutting blades is determined during an automatic packaging process. It is preferable to protectively seal the outer cap 320 while the insertion of the container 300 into the opening unit 200 is stopped during the automatic packaging process. Furthermore, a breakable safety skirt may be provided along the lower end of the outer cap 320.

As shown in FIGS. 11 and 12, the outer cap 320 is rotated clockwise and moves downward so that the breakable part 340 is cut by the first and second cutting blades 220C and 220D at the same time. Thus, the additives are discharged into the bottle body through the discharge ports 212.

The opening unit 200 in the above-mentioned state is stopped by the inclined slots 160 so that the lower end of the additive storage part 330 is stopped by a stop ring 115.

In the present invention, it is preferable to charge

gas, such as nitrogen gas or argon gas, in the additive storage part 330 after the desired additives, such as powder or extract, have been loaded into the additive storage part 330. In the above state, the gas charged in the storage part 5 330 protects the additives and promotes the discharge of the additives when the breakable part 340 is opened.

Each of the first and second cutting blades 220C and 220D is toothed along the upper end thereof and is tapered from the upper end to the lower end thereof so that the 10 blades 220C and 220D cut the breakable part 340 and break away the cut part of the breakable part 340 while folding the cut part due to clockwise rotation and downward movement of the outer cap 320.

Furthermore, if a user wants to shake the transparent 15 bottle body after the two kinds of additives have been completely discharged into the bottle body, the bottle cap of the present invention allows the user to shake the bottle body without worrying about the leakage of a mixture from the bottle body because the gap between the mouth 110 and the 20 outer cap 320 is sealed as shown in FIG. 13.

During counterclockwise rotation of the container 300, the fitting protrusions 212 are separated from the inclined slots 160 and the locking protrusion 386 of the container 300 is stopped by the locking protrusion 286 of the opening unit 25 200 as shown in FIG. 13, so that the container 300 and the opening unit 200 can be removed from the mouth 110 at the

same time.

The detailed construction of the inclined slots 160, the fitting protrusions 212 and the partition wall 352 is illustrated in FIGS. 14 and 15. As shown in the drawings, the bottle cap according to this embodiment improves the operational effect due to the improved structure of the mouth 110.

FIG. 16 illustrates the fifth embodiment of the present invention. As shown in the drawing, the bottle cap according to this embodiment comprises a bottle body 100 having a mouth 110 with an external thread 112 formed around the outer circumferential surface of the mouth 110, and an opening unit 200 inserted into the mouth 110 such that the opening unit 200 can be removed from the mouth 110. An additive storage container 300 is fastened to the external thread 112 of the mouth 110 through a screw-type engagement and interferes with the opening unit 200 at a predetermined position during rotation, thus removing the opening unit 200 from the mouth 110.

The bottle body 100 is provided with a support ring 114 which is formed around the neck of the bottle body 100 by extending outward in a radial direction at a predetermined position below the lower end of the external thread 112.

The opening unit 200 is a cylindrical body which is open at the upper end thereof, thus allowing a slider 330 of the additive storage container 300 to be inserted downward

into the opening unit 200. A conical breaking unit 220 projects upward at the lower end of the opening unit 200. The vertical axis of the conical breaking unit 220 coincides with the central axis of the opening unit 200, so that the conical breaking unit 220 breaks the breakable part 340 which hermetically closes the lower end of the container 300. A pointed pin 337 axially extends upward from the peak of the conical breaking unit 220.

Furthermore, a plurality of linear cutting blades 336 protrude on the conical surface of the breaking unit 220 at spaced positions such that the cutting blades 336 linearly extend downward from the peak to the lower end of the breaking unit 220 and form a pattern like umbrella ribs. The cutting blades 336 cut the breakable part 340 during downward movement of the container 300. A plurality of discharge openings are formed on the conical surface of the breaking unit 220 at positions between the linear cutting blades 336.

When the breakable part 340 is cut by the cutting blades 336, the additive can be quickly discharged through the discharge openings without being impeded by a discharging structure, unlike a conventional bottle cap.

The additive storage container 300 includes an end plate 310 which is placed on the open end of the sidewall of a receiving chamber 210 of the opening unit 200. A main cap 320 integrally extends downward in an axial direction from the outer circumferential edge of the end plate 310 and is

provided with an internal thread 322 which engages with the external thread 112 of the mouth 110 through a screw-type engagement. An additive storage part 330 acting as a slider integrally extends downward in an axial direction from the inner circumferential edge of the end plate 310 and is  
5 movably inserted into the receiving chamber 210 such that the storage part 330 can move in the receiving chamber 210 in an axial direction. The additive storage part 330 opens or closes the discharge ports 212 formed around the lower end of the sidewall of the opening unit 200. The lower end of the  
10 additive storage part 330 is hermetically closed by the breakable part 340.

The breakable part 340 is preferably made of a material which can be easily broken by both the pointed pin  
15 337 and the cutting blades 336 of the breaking unit 220. In the present invention, it is possible to form the breakable part 340 by integrating a thin film, made of aluminum or a synthetic resin, with the outside edge of the lower end of the additive storage part 330 through thermal bonding or  
20 ultrasonic bonding.

Preferably, the breakable part 340 is configured such that the breakable part 340 can be easily pierced by the pointed pin 337 and can be easily cut by the cutting blades 336, but reliably remains coupled to the additive storage  
25 part 330 without being completely removed from the storage part 330 even when the breakable part 340 is cut.

Furthermore, the additive storage container 300 is provided with a locking ring 341 which is coupled to the lower end of the main cap 320. The locking ring 341 is integrally formed with the main cap 320 through a molding process such that the ring 341 is coupled to the main cap 320 by a plurality of connection ribs 342. The locking ring 341 is placed around the external thread 112 with an annular space defined between the locking ring 341 and the outer circumference of the external thread 112. The size of the above-mentioned annular space is determined to allow the main cap 320 to be inserted into the space.

An inside spiral ratchet 214 is formed around the outer circumferential surface of the sidewall of the receiving chamber 210 at a position close to the open end of the receiving chamber 210 by extending outward in a radial direction. An outside spiral ratchet 325 is formed on the inner circumferential surface of the main cap 320 at a predetermined position by extending inward in a radial direction so that the outside spiral ratchet 325 comes into engagement with the inside spiral ratchet 214 of the opening unit 200.

The inside spiral ratchet 214 and the outside spiral ratchet 325 are configured such that they are allowed to rotate only in one direction relative to each other.

The operation of the bottle cap according to the fifth embodiment will be described herein below. In the following





description, the term "clockwise" means a tightening direction in which the additive storage container 300 is tightened to the mouth 110, and the term "counterclockwise" means a loosening direction in which the additive storage  
5 container 300 is loosened from the mouth 110.

FIG. 17 illustrates the container 300 which has completely advanced into the opening unit 200 by being rotated clockwise from an initial state shown in FIG. 16. As shown in the drawings, when the container 300 is rotated  
10 clockwise, the internal thread 322 of the main cap 320 is rotated along the external thread 112 of the mouth 110 and moves downward (in the tightening direction).

In the above state, the support ring 114 prevents downward movement of the locking ring 341 so that the  
15 connection ribs 342 are broken. Thus, only the main cap 320 is inserted into the annular space between the mouth 110 and the locking ring 341.

Furthermore, the additive storage part 330 moves downward so that the breakable part 340 of the storage part  
20 330 is primarily pierced by the pointed pin 337 which projects upward at a position below the breakable part 340. When the downward movement of the storage part 330 continues, the breakable part 340 is cut and opened by the cutting blades 336 which are formed on the conical surface of the  
25 breaking unit 220 in the pattern like umbrella ribs. Thus, the additive is quickly discharged into the bottle body 100

through the discharge openings of the breaking unit 220 and the discharge ports 212.

When the downward movement of the additive storage container 300 is stopped, the user shakes the bottle body, thus completely discharging the additive from the receiving chamber 210 into the bottle body.

In the above state, no structure impeding the discharge of the additive from the container is provided between the interior of the bottle body 100 and the receiving chamber 210 which communicates with the bottle body through the breaking unit 220. Thus, the additive is efficiently mixed with the bottled material.

The breakable part 340 is preferably made of the above-mentioned material which has a surface strength and flexibility capable of preventing the part 340 from being broken into fragments.

During the above-mentioned rotation of the container 300, the outside spiral ratchet 325 is rotated and moves downward. When the outside spiral ratchet 325 engages with the inside spiral ratchet 214, the outside spiral ratchet 325 can be rotated relative to the inside spiral ratchet 214 due to the ratchet structure thereof. Thus, the main cap 320 can continue its downward movement while a click sound is generated by the spiral ratchets 214 and 325.

In the above state, the teeth of the outside spiral ratchet 325 pass over the teeth of the inside spiral ratchet

214 and are seated in the roots defined between the teeth of the inside spiral ratchet 214.

Because the two spiral ratchets 214 and 325 in the above state are not restricted in the rotating direction thereof, the outside spiral ratchet 325 can be freely rotated around the inside spiral ratchet 214. When the container 300 in the above state is rotated counterclockwise, the container 300 is rotated along with the opening unit 200 because the inside spiral ratchet 214 prevents the outside spiral ratchet 325 from rotating in the opposite direction. The internal thread 322 of the container 300 in the above state is rotated along the external thread 112 of the mouth 110 and moves upward, so that the container 300 and the opening unit 200 can be removed from the mouth 110 at the same time as shown in FIG. 18.

The locking ring 341, which remains around the neck of the bottle body 100 in the above state, is independent from the main cap 320 so that it is required to separately handle the ring 341.

Preferably, the above-mentioned object is accomplished by a skirt (not shown) which is preferably provided at a position below the lower end of the locking ring 341 so that the skirt is stopped by the support ring 114 and supports the locking ring 341 around the support ring 114 without requiring additional handling of the locking ring 341. The locking ring 341 naturally becomes separated from the main

cap 320 during rotation of the container 300 so that it is not necessary to intentionally separate the ring 341 from the main cap 320. Thus, the bottle cap can be easily operated and, furthermore, both the additive storage container 300 and the opening unit 200 can be removed from the mouth of the bottle body at the same time.

#### **[Industrial Applicability]**

As described above, the present invention provides a bottle cap in which a breakable part is cut and opened during rotation of an additive storage container, thus discharging an additive into a bottle body. The present invention effectively seals the additive storage container so that the container withstands changes in its inner pressure caused by variation in atmospheric temperature, thus preventing leakage, oxidations or decomposition of the additive, and preventing a change in quality of the additive during long-distance transportation or long-term storage of products.